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中国景天属一些种的订正*

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NOTES ON SOME SPECIES OF *SEDUM* (CRASSULACEAE) IN CHINA

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Abstract Six species of *Sedum* are taxonomically discussed and revised in the present paper. As a result, names of seven species, one subspecies and two varieties are reduced. Critical comments on and a full synonym of these taxa are presented. The taxonomic status of *S. phyllanthum* Lévl. et Vant. and *S. subtile* Miq., which were treated as doubtful species in Flora Reipulicae Popularis Sinicae(FRPS) Vol. 34(1), is discussed. *S. formosanum* N. E. Br., treated as a synonym of *S. alfredii* Hance in FRPS, is recognized as a distinct species, and it is found to extend westwards to the mainland of China. *S. hakonense* Makino is recorded as new to China.

Key words *Sedum*; *S. aizoon*; *S. lineare*; *S. phyllanthum*; *S. subtile*; *S. hakonense*; *S. formosanum*; Revision

1 **Sedum aizoon** L., Sp. Pl. 430. 1753; Maxim. in Bull. Acad. Sci. St. Pétersb. **29**: 143. 1883; Praeger in J. Roy. Hort. Soc. **46**:108, fig. 54(a)～56. 1921; Fröd. in Act. Hort. Gothob. **6**(Append.): 77, pl. 43～45, fig. 599～613. 1931; Boriss. in Kom., Fl. URSS **9**:67. 1939; Anonymous, Icon. Cormophyt. Sin. **2**: 88, fig. 1905. 1972; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):128, pl. 29, fig. 1～5. 1984. —— *S. aizoon* var. *latifolium* Maxim. in Mém. Acad. Sci. St. Pétersb. Sav. Étrang. **9**: 115. 1859; id. in Bull. Acad. Sci. St. Pétersb. **29**:144. 1883; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1): 129. 1984, syn. nov. —— *S. pseudo-aizoon* Debeaux in Act. Soc. Bordeaux 31:159. 1877. —— *S. yantaiense* Debeaux, l. c. 160. —— *S. floriferum* Praeger in J. Bot. **56**: 149. 1918; id. in J. Roy. Hort. Soc. **46**:122, fig. 54(d), 63～64. 1921; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1): 132. 1984, syn. nov. ——*S. austro-manshuricum* Nakai et

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Kitagawa, Report First Sci. Exped. Manch. Sect. IV. pt. 1: 26. 1934.—— *S. selskianum* var. *glabrifolium* Kitagawa, l. c. pt. **4**:21. 1936. —— *S. aizoon* f. *glaberrimum* (Kitagawa) Kitagawa, Lineam. Fl. Manch. 247. 1939. —— *S. aizoon* var. *austro-manshuricum* (Nakai et Kitagawa) Kitagawa, l. c. 1939.—— *S. hsinganicum* Chu [in Liou, Clav. Pl. Chin. Bor.-Orient. 124, pl. 33, fig. 5. 1959, nom. nud.] ex S. H. Fu in Bull. Bot. Lab. North-East. Forest. Inst. **1**(6):73. 1980; id. in Fl. Reip. Pop. Sin. **34** (1):130. 1984, syn. nov. [Type: E'ergunaqi, Nei Monggol, China, Z. Wang *et al.* 1834 (holotype, IFP)]

Sedum aizoon L. is one of the most morphologically variable species in the genus, especially in leaf shape, serration and branching of stem. The wide variation was found in the field to be only a result of adaptations to different habitat conditions. *S. floriferum* was described by Praeger based on the plant grown from seeds which were collected from Weihai, Shandong Province of China , and sent to Kew by Liardet in 1911. In the diagnosis this species was said to differ from *S. kamtschaticum* and *S. hybridum* in "Sepalis linearibus aut oblanceolatis (nec basi latis ut in speciebus sectionis Aizoontis pluribus) foliisque subsimilibus cum priore concordat; caulibus annuis autumno surgentibus carpellisque ab illa specie differt et ad *S. kamtschaticum* appropinquat; ab ambolus caulibus ramos multos breves ex parte superiore edentibus aspectum distinctum conferentibus differt". Although it was said allied to *S. hybridum* and *S. kamtschaticum*, Praeger's detailed illustration and the specimens collected from the type locality indicate that it is very similar to *S. aizoon* in regard of the shape of its rhizome, petal and fruit. As for branching, it is very variable and affected greatly by habitat condition. Usually, plants in a favourable habitat often bear many axillary branches, and any stem would branch if its growing point is injured.

Sedum hsinganicum was proposed by Y. C. Chu based on the specimen collected from E'ergunaqi, Inner Mongolia. S. H. Fu (1980) validated the name, and in the species diagnosis, he wrote: "Haec species habitu *S. aizoo* L. var. *latifolio* Maxim. similis, sed floribus 8(12, 20)-meris, foliis oppositis differt". I examined its holotype and isotype, and found that its floral components vary in number and shape among different flowers of the same individual. Meanwhile, its phyllotaxy is not the same as described above. In fact, this description was based on the plant with injured floral buds. So, Chu's *S. hsinganicum* is reduced to a synonym of *S. aizoon*.

Sedum aizoon L. is a widely distributed species, found throughout China except Xinjiang, Xizang, Guangxi, Guangdong, and Taiwan. So a vast number of specimens exist in herbaria, and thus specimen citation seems to be unpractical.

A number of infraspecific taxa have been described in *S. aizoon*. Three varieties and two forms are recognized in China(Fu, 1984) . The examination of specimens deposited in PE, KUN, NAS, WUK, SZ, CDBI, IFP, SM, HNWP, HIB, N, YUKU, WNU [Herbarium abbreviations follow L. K. Fu's "Index Herbariorum Sinicorum"(1993)] and field observations have convinced me that only two infraspecific taxa should be recognized.

1a. *Sedum aizoon* var. aizoon

1b. *Sedum aizoon* var. *scabrum* Maxim. in Bull. Acad. Sci. St. Pétersb. **29**: 144. 1883; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):130. 1984.—— *S. aizoon* f. *angustifolium* Franch. in Nuov. Arch. Mus. Hist. Nat. Paris II. **6**:9. 1883.—— *S. aizoon* var. *yamatutai* Kitagawa, Lineam. Fl. Mansh. 247. 1939.—— *S. aizoon* var. *angustifolium* (Franch.) Chu in Liou, Clav. Pl. Chin. Bor.-Orient. 126. 1959, nom. nud.; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):129. 1984, syn. nov.

Distribution Heilongjiang, Jilin, Liaoning, Nei Monggol, Hebei, Shanxi, Shaanxi, Gansu, Ningxia, Qinghai, at the edges of forests, in thickets or slope grassland, alt. 500～3500 m. Also found in Russia.

This variety is distributed in the northern part of the distribution area of the species. It is distinquishable from the typical variety by having tuberous rhizomes, scabrous stems and narrow leaves less than 7 mm in width.

2 Sedum lineare Thunb., Fl. Jap. 187. 1784; Maxim. in Bull. Acad. Sci. St. Pétersb. **29**: 149. 1883; Preager in J. Roy. Hort. Soc. **46**:227, fig. 131. 1921; Fröd. in Act. Hort. Gothob. **6**(Append.): 87, pl. 53, 54(1). 1931, p. p.; Ohwi, Fl. Jap. 590. 1953; Anonymous, Icon. Cormophyt. Sin. **2**: 90, fig. 1910. 1972; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1): 144. 1984.——*S. onychopetalum* Fröd. in Sinensia **3**:199. 1933; id. in Act. Hort. Gothob. **10**(Append.):163, fig. 1315～1323. 1935; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):142, pl. 31, fig. 13～18. 1984, syn. nov. [Type:"Zijing Mt., Nanjing, Jiangsu ("Purple Mt., Nanking, Kiangsu") China, C. Y. Lu & S. W. Teng 9636 (holotype, NAS)]——*S. grammophyllum* Fröd. in Act. Hort. Gothob. **10**(Append.): 164, fig. 1324～1331. 1936; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):144. 1984, syn. nov. [Type: Guangdong ("Ying Tak, Kwangtung") China, X. P. Gao(S. P. Ko) 50494 (holotype, WU; isotype, SYS)] ——*S. anhuiense* S. H. Fu et X. W. Wang in Bull. Bot. Res. **6**(4): 137, fig. 1～8. 1986; Z. W. Xue in Fl. Anhui **2**:504, fig. 848. 1986, syn. nov. [Type: Daliu, Chuxian, Anhui, China, Y. F. Hsiao et T. Ren 503 (holotype, AIB; isotype, HIB)]

Sedum lineare Thunb. is very variable with regard to size of leaves, bracts and inflorescences. In moist, shaded habitats, leaves, bracts and inflorescence are often well developed and larger than those in exposed ones. Many taxa have been described on the basis of the extreme forms of these variations. *Sedum onychopetalum* and *S. grammophyllum* were both described by Fröderström (1936, 1933), and said to be closely allied to *S. lineare*, from which the former differed, according to him, in larger inflorescences and the shape of petals, while the latter in very long bracts and long-mucronate petals. A close examination of the type material of *S. onychopetalum* reveals that it is indistinguishable from *S. lineare*. Although I have not examined the latter's type specimen, the original description and illustration of the holotype of *S. grammophyllum* show no differences from *S. lineare.*

Sedum anhuiense was proposed by S. H. Fu et X. W. Wang based on the specimen collected from Daliu, Chuxian, Anhui Province. It was said to differ from *S. japonicum* by " inflorescentia elongata laxiflora , pedicellis 3～4 mm longis". However, *S. japonicum* is distinct by its phyllotaxy, leaf shape, and stem branching. *S. anhuiense* has much the same appearance as *S. linear* except its inflorescences. I am very interested in this species for its unique inflorescence in the genus *Sedum.* By examining specimens from its type locality and its isotype, it is rather certain that the formation of the special inflorescence is the result of continuing growth of plants when pressed. So, *Sedum anhuiense* is reduced as a synonym of *S. lineare* Thunb.

Distribution Guangdong, Fujian, Guangxi, Zhejiang, Jiangsu, Anhui, Jiangxi, Hubei, Hunan, Guizhou, Yunnan, Sichuan, Shaanxi, Henan, Gansu, Shanxi, Hebei, Shandong. Also found in Japan.

3 **Sedum phyllanthum** Levl. et Vant. in Bull. Soc. Agr. Sci. Arts Sarthe **59**: 318. 1904; id. in Repert. Sp. Nov. **6**:373. 1909; Lauener in Not. Bot. Gard. Edinb. **30**:292. 1970; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):156. 1984, pro sp. dubia. [Type: Pingba, Guizhou ("Kweichow,environs de Gan-pin"), China, Martin & Bodinier 2406 (holotype, E)]—— *S. yvesii* Hamet in Repert. Sp. Nov. **8**:27. 1910; Fröd. in Act. Hort. Gothob. **6**(Append.): 84, pl. 50(3), fig. 646～653. 1931; S. H. Fu in Fl. Reip. Pop. Sin. **34** (1): 141, pl. 32, fig. 1～9. 1984, syn. nov. [Type: Yichang, Hubei ("Ichang, E. Szechuan"), China, Henry 3443(holotype, P)]——*S. quaternatum* Praeger in Proc. Roy. Irish Acad. **35B**: 6, pl. 2(upp. f). 1919; Fröd. in Act. Hort. Gothob. **6** (Append.):85. 1931; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):142, pl. 32, fig. 10～16. 1984, syn. nov. [Type: Mt. Jigong, Henan, China ("Kiu-Kung Mts, Honan-Hupeh-Kiangsi border, Central China"), Bailey no. 9 (holotype, A?)]

Sedum yvesii Hamet and *S. quaternatum* Praeger were treated by Fröderström (1931) and S. H. Fu (1984) as independent species. The latter was described based on the specimen Bailey No. 9 collected at Mt. Jigong, Henan Province. Its taxonomic status is commentted by Praeger as "it comes nearest to *S. yvesii*, in which however, in addition to the difference of leaf, the flower are stalked (not sessile), the sepals linear (not oblong-lanceolate), the petals ovate (not lanceolate) and the scales obovate-cuneiform(not quadrate)". Their leaf shape was different from each other in "obovato-linearia, obtusa" for the former, and "anguste lanceolata, acuta" for the latter based on their original descriptions. By close examination of the their type photographs and the specimens from type locality, I found that the characters used by Praeger are the two extremes and all transitions occur. In identifying specimens of Chinese *Sedum*, I found the two sheets collected from Guizhou (S. Z. Jiang 40449, Qianbei Exped. 030) which agree very well with the description of *S. phyllanthum* Lévl. et Vant.. No differences have been found between *S. phyllanthum* and *S. yvesii.*

So, the three species mentioned above are actually conspecific and treated a single species in the present paper.

Specimens examined: **Gansu**: Wudu, Z. Y. Zhang 1215(WUK), 4979(WUK), 4537(WUK), 5114(WUK); Kangxian, Y. C. He *et al.* 142(WUK), 258(WUK);Jiaoxian, T. P. Wang 19331(WUK) . **Shaanxi**: Lueyang, G. Q. Li 210(WUK), 3146 (WUK); Fengxian, K. T. Fu 13265(WUK); Baoji, Z. X. Hu *et al.* 262(WUK); Taibai Mt. , J. X. Yang 184(WUK), P. K. Kuo 4503(WUK); Meixian, T. P. Wang 13756(WUK), 19907(WUK); Fuping, K. T. Fu 4716(WUK) ; Ningshan, J. Q. Xing 4212(WUK), 3052 (WUK); Shiquan, J. Q. Xing(WUK); 1172(WUK), 2816 (WUK), 3883(WUK); Zhen'an, X. X. Hou 107(WUK), 531(WUK), K. T. Fu 11318(WUK); Pingli, P. Y. Li 1469(WUK), 2407(WUK), Northwest. Univ. Exped. 369(WNU). **Shanxi**: Qinshui, Huangtu Pl. Exped. 253(WUK). **Henan**: R. H. Huang 3769 (HIB), Henan Exped. 576(PE). **Hubei**: Badong, R. H. Huang 871(HIB); Yichang, Z. D. Jiang 034(PE), Z. Zheng 1686(HIB); Xingshan, Y. Jiang 184(PE), H. J. Li 2096(PE); Zhuxi, K. M. Liu 8569(PE); Junxian, Z. D. Jiang 208(HIB), 223 (HIB). **Hunan**: Nanfushan Mt. , anonymous 18832(PE). **Sichuan**: Fengjie, H. F. Zhou 107809(WUK); Nanchuan, Jifoshan Exped. 3110(PE). Z. X. Chu 932(PE), S. C. Chen 2308 (PE). **Guizhou**: Pingba, S. Z. Jiang 40499(HIB, WUK); Zunyi, Guizhou Exped. 3110(PE). **Jiangxi**: Lianhua, Jiangxi Univ. Exped. 651276(HIB), Lushan Mt. , K. T. Fu 19572(WUK), G. Y. Rao 058(WUK). **Zhejiang**: Tianmu Mt. , M. B. Deng 3895(WUK), X. Y. He 21013(PE).

4 **Sedum subtile** Miq. in Ann. Mus. Bot. Lugd. Bat. **2**:156 1866; Maxim. in Bull. Acad. Sci. St. Pétersb. **29**:153. 1883; Fröd. in Act. Hort. Gothob. **6**(Append.): 87, pl. 54(2,3), fig. 675～685. 1931, pro syn. ; Ohwi, Fl. Jap. 591. 1953; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1): 157. 1984, pro sp. dubia; H. Ohba in J. Jap. Bot. **61**:227. 1986.——*S. subtile* ssp. *chinense* H. Ohba in J. Jap. Bot. **61**: 227. 1986, syn. nov.

Sedum subtile Miq. was treated by S. H. Fu as a doubtful species in FRPS for the lack of reliable specimens. Ohba(1986) described a subspecies, ssp. *chinense*, in this species based on a specimen (H. Smith 6664) collected from Yuanchu, Shanxi of China. It was said to differ from the type subspecies in" foliis rosulatis lineari-oblanceolatis(non late obovatis-spathulatis) et caulium plusminusve isomorphis 5～15 mm longis glandulis oblongis (nec triangulari-obovatis)". By the field observation and examination of flowers of this species, I found that it is variable in leaf and gland shape even within a population. These features are of little taxonomical significance. The evidence from specimens and field investigation of *S. subtile* indicates that it is much related to *S. alfredii*.

Specimens examined: **Zhejiang**: Longquan, G. Y. Rao 045(WUK) . **Jiangxi**: Suichuan, anonymous 740(PE).

5 **Sedum hakonense** Makino in Bot. Mag. Tokyo **15**: 35. 1901; Fröd. in Act. Hort.

Gothob. **6**(Append.):102, pl. 65(4), fig. 810～818. 1931; Ohwi, Fl. Jap. 591. 1953; Treasaki, Ill. Fl. Jap. 289, fig. 1113. 1977; Ohba in Satake, Wild Flow. Jap. **2**:147, pl. 139(1). 1982.

This entity has been regarded as a species endemic to Japan since its publication. It is recorded as new to China here.

Specimens examined: **Guangdong**: Renhua, L. Deng 7223(PE, NAS). **Fujian**: Jianyang, Wuyishan Exped. 1865(NAS); Nanjin, G. D. Ye 2036(NAS). **Hunan**: M. X. Huang 112093(WUK).

6 Sedum formosanum N. E. Br. in Gard. Chron. **24**:134. 1885; Hayata, Icon. Pl. Formos. **2**:12. 1912; Praeger in J. Roy. Hort. Soc. **46**: 295, fig. 175 . 1921; Fröd. in Act. Hort. Gothob. **6**(Append.): 96, pl. 62, fig. 778～784. 1931; H. Ohba in J. Jap. Bot. **52**: 322. 1977; ibid. **59**:326. 1984; S. H. Fu in Fl. Reip. Pop. Sin. **34**(1):148, pro syn; Tang et Huang in Fl. Taiwan(2nd ed.) **3**:21, pl. 13. 1993. ——*S. alfredi* auct. non Hance: Liu et Chung in Fl. Taiwan **3**:16. 1977.

Sedum formosanum was reduced to synonym of *S. alfredii* Hance by Liu & Chung (1977) , the treatment was followed by Fu(1984) in FRPS. A revision of *S. alfredii* group has been made by Ohba(1984). He points out not only the differences between *S. alfredii* and *S. formosanum*, but also the phylogenetic relationships within the group. I support Ohba's viewpoint and the taxonomic treatment of *S. formosanum* by my examination of specimens and field observation. It has not been reported from the mainland of China before.

Specimens examined :**Fujian, China**: in the margin of thickets, roadside at elevations below 500 m. , G. Y. Rao 050, 051(WUK) . Also found in Japan and the Philippines.

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摘要 本文对国产景天属的6种植物进行了分类订正。归并了7种1亚种和2变种，同时对中国植物志中景天属存疑种 *Sedum phyllanthum* Lévl. et Vant. 和 *S. subtile* Miq. 的范围及其分类地位进行了讨论。根据对 *S. hsinganicum* Chu ex S. H. Fu 的模式标本以及 *S. floriferum* Praeger 模式标本图和模式产地标本的研究，确认二者所具性状均在 *S. aizoon* L. 的性状变异范围内，故予归并。*S. onychopetalum* Fröd.，*S. grammophyllum* Fröd 以及 *S. anhuiense* S. H. Fu et X. W. Wang 经研究均被作为 *S. lineare* Thunb. 的异名处理。*S. formosanum* N. E. Br. 在《中国植物志》中被并入 *S. alfredii* Hance，现恢复为独立的种。此外还报道了一个中国新记录种 *S. hakonense* Makino。